RTTY JOURNAL
Box 837
Royal Oak, Mich. 48068
Editor & Publisher 'Dusty' Dunn, W8CQ

SUBSCRIPTION RATES

U.S. Canada- Mexico	1st Class	$3.00
	Air Mail	$3.50
Other Countries	Surface Mail	$3.50
AirMail South-Central America		$6.00
Air Mail - - -	All Other Countries	$7.00

BACK ISSUES

New subscriptions and classified ads are cash in advance as we have no method for billing. New subscriptions will be started with the current issue and one back issue, if requested. Please do not ask us to start any further back than this. Back issues - if available - may be ordered at 30¢ each at time of subscription. The JOURNAL is mailed about the 20th of the month preceding the dated month. May and June are a combined issue and July-August is a combined issue.

The ONLY back issues available are listed below. 30¢ each.

1966- Oct.- [1]
1971- July-Sept.-Nov.- [3]
1972- April-May-July-Sept.-Oct. Nov.- Dec.- [7]
1973- Complete. [10]
1974- Complete. to date [7]

RTTY BINDERS $3.50 PP.

***

****

Address Correction Requested
RTTY JOURNAL
P O Box 837
Royal Oak, Mich. 48068

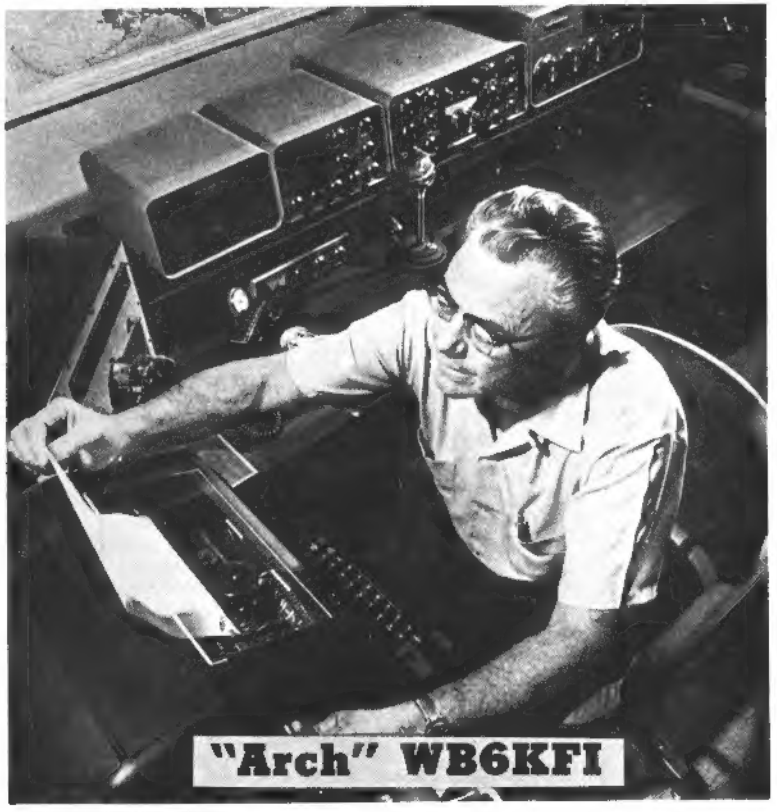
FIRST CLASS MAIL

RTTY JOURNAL

October 1974

EXCLUSIVELY AMATEUR RADIO TELETYPE

VOLUME 22 No. 8 30 Cents



CONTENTS

KEYBOARD STREAKING - - - - - - - - - - - 2
IMPROVED SCOPE DISPLAY - - - - - - - - - 3
FAIL SAFE TIMER - - - - - - - - - - - - - 4
NEW RTTY JOURNAL AWARDS- - - - - - - - - 5
NS-1 PPL DEMODULATOR - - - - - - - - - - 6
UART DRAWING - - - - - - - - - - - - - - 7
VHF NEWS - - - - - - - - - - - - - - - - 8
DX NEWS - - - - - - - - - - - - - - - - - 10
CW ID-ER - - - - - - - - - - - - - - - - - 12

Keyboard Streaking

"DUSTY"CHAPMAN, WA3IKK
2009 Lincoln St.
CAMP HILL, PA. 17011

While listening on twenty meters the other night, I ran across a fellow RTTY-'er calling CQ. When he finished, a Know-It-All Keyboard Streaker came on the frequency and proceeded to tell this guy that he had called CQ the wrong way. He suggested that the 3X3 method be used. He then went off the air (without identifying) never to be heard again. The gentleman who had called CQ came back to the anonymous streaker and apologized for being a newcomer to RTTY and asked what 3X3 meant. Naturally he got no reply.

That really bent me out of shape, so alas, I put the ST-6 on standby and this is what I have come up with to help the newcomer. (and the streaker)

All who have printed me on the air know that I am the worst typist to ever come down the pike. They also know that I am not the best operator either. However, in just over three years on RTTY, I have picked up a lot of operating tips from you Hams out there. I think it would be a good idea for all of us to follow some of these tips.

I am not a picture nut, but an article a few years ago by the King of tape makers, WA6PIR, entitled "RTTY ART MADE EASY", (Nov. 70-RTTY Journal) had a lot to say about just normal QSO's as well as making tapes for pix. If at the end of every line we all sent two CR's, one LF, and then two LTRS, (unless the next character is upper case) it would make copy a lot better. This would practically eliminate piling up at the end of a line and overlining. That QSB really takes its toll with only one CR. For making tapes, this step is a definite must.

Aha, the old three by three (3X3) trick, or three CQ's and your call three times, and repeat till you're blue in the face. Tis a great rule for CW and SSB, but it doesn't seem to hold much water for RTTY. Three CQ's just aren't enough. I like six CQ's and then my call three times unless I'm calling CQ DX, whereby I send three CQ DX, my call three times, followed by two of each to fill out the line. But WOW, a whole line of CQ's and no call, or five lines of CQ, then your call only once or twice. That's really unfair to the guy printing you. Better yet, the guy who calls CQ for ten or fifteen lines at a time. How many times have you wondered if the one calling had died? What's the matter with half that many and if no one calls you, try it again? Could be, since all the lines are numbered, he's saying, "Hey, I can count." During contests, good operators I know almost go nuts when they run across someone doing this. They could have worked two more stations in the time that one CQ has been called. Also, contest operators aren't interested in your life history at that time either. Please run your brag tape for them after the contest.

Oh yes, after proper call exchanges, I have yet to figure out why we have to add ten or fifteen "K's", when one says "I'm finished". This one's a dandy too. Typing "CW ID follows" to another statesider is really an insult to his intelligence. If he doesn't know its coming, he's really hurtin.

While working for W.A.S. and DXCC on RTTY, nothing hurt worse than receiving a QSL card with the mode space left empty or CW written-in instead of 2XRTTY. It is a lot of fun to run that QSL on tape to the station you are working, but do you know how much that means in credit towards W.A.S. or DXCC? You're right, Nothing! But let's not talk about QSL's, because half the cards with s.a.s.e.'s or s.a.e.'s and I.R.C.'s don't seem to get answered anyway. HUMMM, this is courtesy?

If you use "Unshift on Space", you know how nice it is to receive a "579 TUO TUO" report -- or the more famous "73 UE UE". Can't we use the LTRS and FIGS keys? Wonder why they are on all the machines?

Guess what now? Even on 80 meters, some RTTY'ers are causing less crowded conditions. W8CQ said it all with "Be Broad Minded. Use Narrow Shift". It's nice to see that some of us can read, even though none of us seeems to speell gud.

It has been written that the Ham fraternity is a friendly one, but why did a Ham tell me to go to hell the other night just because I tuned up on top of him without listening first? Can't understand some of these friends. He must be the one who puts on that loop tape of line feeds.

Mebbe now the newcomer and I will be safe from the Know-It-All Keyboard Streaker. If not, just tell us what, and why, we do wrong, but please add your call to the end. We are all adult Hams who can take "Proper" criticism. UE

***

IMPROVED SCOPE DISPLAY

IRVIN M. HOFF, W6FFC
12130 Foothill Lane.
Los ALTOS HILLS, CA. 94022

INTRODUCTION:

Solid-state demodulators such as the ST-5 and ST-6 use relatively low-voltage power supplies as compared with tube type units like the TT/L, etc. As a result some oscilloscopes of modest gain give mediocre displays when used with these units. Additional tuned circuits could be used for more precise tuning and straighter lines on the scope, but these further reduce the voltage to the oscilloscope. Finally some scopes have rather low impedance inputs that tend to unbalance the discriminator output and further reduce the voltage available. The following paragraphs will describe a simple and low-cost circuit that provides ample gain, very high input impedance, very low output impedance and excellent precision for sharp and accurate tuning.

THE CIRCUIT:

The scope output of the ST-6 is run through an isolation resistor. A 3.3 meg is suggested. After this a parallel-tuned 88 Mh. toroid is connected to the non-inverting input (marked plus) to ground. The dual 741 op amp then amplifies the small voltage (approximately 70 millivolts by this time) back up to about 10 volts peak-to-peak at the output of the op amp. The tuned toroid not only gives a very sharp, precise tuning display, it also has sufficient selectivity to give virtually straight lines on the scope in place of the customary "bananas" seen with simple linear discriminators.

The input impedance at the non-inverting input (marked plus) is very high, in the order of at least several hundred megohms. The output impedance is very low, typically less than one ohm. The circuit can be used successfully with low impedance scopes such as the Heath Monitorscope, etc.

COMPONENTS:

The dual op amp may be any of a variety of integrated circuits. Individual 741 units may be used which sell for $0.50 each at places like Poly Paks. The dual 741 mini-dips sell for about $1.25. The Signetics N5558V is a dual op amp as is the Motorola MC1558G. If you have a nearby Radio Shack outlet, their item 276-028 at $1.50 is equally acceptable.

TUNING THE TOROIDS:

Use an identical technique to that used when constructing the demodulator in the first place. If a digital counter is handy the entire job becomes fairly simple. One toroid is tuned for mark tone and the other tuned for space tone.

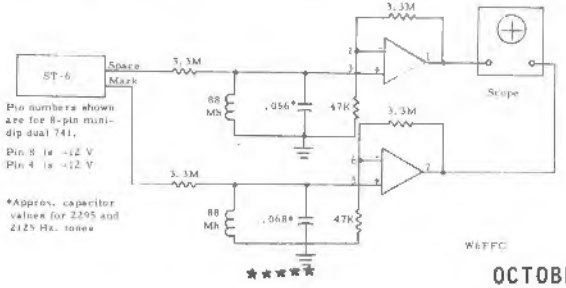
A suitable audio tone from the receiver may be used to tune the filters, but in this case use as large a resistor between the audio source and the tuned circuit as is convenient - - at least 100K.

You can also tune the toroids "in place" in the circuit shown. The op amp not only will isolate the circuit but also has enough gain to allow use of a normal VOM while tuning the toroids.

The output of this circuit is typically 10 volts AC, peak-to-peak. This should be substantially more than minimum necessary to run even the most modest scope.

SUMMARY:

The scope output voltage of solid state demodulators such as the ST-5 and ST-6 is relatively low. It may be insufficient to give a suitable display on oscilloscopes with modest gain. In any event, the use of additional tuned circuits is quite advantageous as they will give a nice display with straight lines as well as good precision tuning. The circuit shown will accomplish this at a very nominal cost. The op amps are inexpensive and use the plus 12 and minus 12 volts available from the demodulator.



*****

FAIL SAFE TIMER

ROBERT C. CLARK, WA4VYL
823 Jones St.
MARYVILLE, TN, 37801

This timer was designed to provide for the disabling of an automatic RTTY transmitter in the event of some type of control failure. In particular, this station has features which allow control codes to be punched on tape. After starting a tape the operator may leave the room to work on one of the many unfinished projects always waiting in the basement. Another feature allows a remote operator to punch tape on the LRXB composite tape set and then have it automatically "replayed" at its completion (operator on premises, but not necessarily at the control console). In either case, a tangled tape or a mispunched control code could leave the transmitter keyed. There is also the possibility of the operator leaving switching set-up in such a way that the system can not function properly. In all such installations, it is necessary to provide some sort of backup control so that the channel is not blocked by a stalled automatic system.

This system allows the transmitter to remain keyed no longer than ten minutes (five minutes for the replay). If the time limit is exceeded, the transmitter is removed from the air and can not be rekeyed until reset by the control operator. The timer is reset by the CW identification device. Hence, it is possible to make transmissions longer than ten minutes, but only if the proper identification is given. Station control wiring prevent a remote station from inserting the CW ID sequence on a replay tape, however, such codes may be inserted when the control operator punches tape.

Originally, it was planned to use a simple NE-555 to set the ten minute time period. I found it impossible to reach the ten minute limit with the capacitors I had on hand. Since such capacitors were also expensive and some what difficult to find, it was decided to go to a shorter period and use a 7490 divider to extend the period. This approach costs no more than the original plan with a high quality/cost capacitor, and it allows for other timing periods as well.

The NE-555 oscillator is set at approximately one cycle every 1.4 minutes. The output is introduced to the 7490 decade divider. Pin 11 of the 7490 goes high on the eighth count (approximately 11.2 minutes) after the 7490 is enabled by U4b. Then the output of U3d goes low, forcing the output of U3c high. When pin 8 of the U3c goes high, Q1 conducts, removing the base bias from Q2. When Q2 stops conducting, the disable relay opens, resetting a holding relay in the control unit and disabling the entire automatic system. The Q1, Q2 configuration was chosen so that the disable relay would be normally on and power supply failure would also reset the system.

When the replay is enabled U3a pin goes high. Pin 8 of U2 goes high on a count of four (approximately 5.6 minutes). U3b goes low, shutting down the disabled relay as previously described.

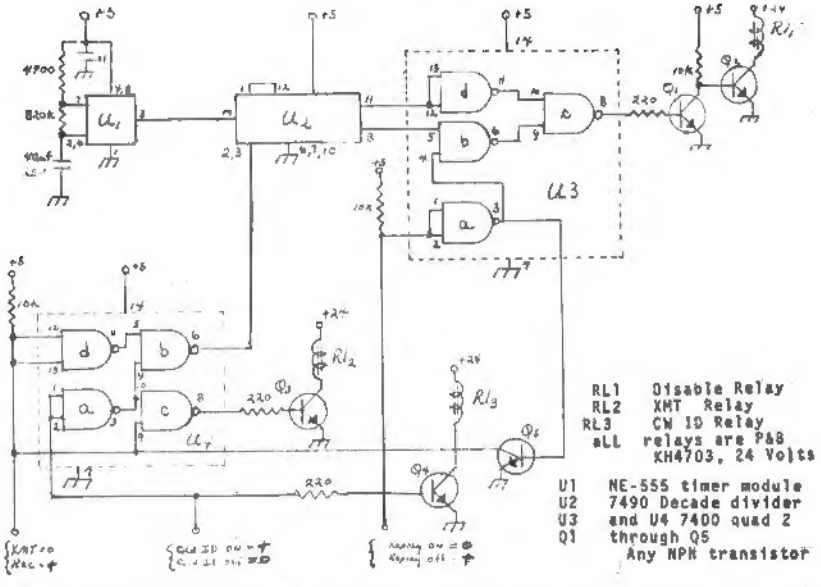
The 7490 is enabled when the transmitter is on (U4d pins 12 and 13 low). If however, pin 3 of U4a is forced low (by the CW ID device), then U4b pin 6 goes high resetting the 7490 to its zero count. It has not been found necessary to reset the oscillator, but this may be done for increased accuracy in the timing periods.

If either the transmitter or the CW ID is keyed, Q3 conducts keying the "XMT" relay. Also, when the CW ID is keyed R4 conducts, keying the "CW ID" relay which is used to disable the station tape readers and keyboard during the identification sequence.

When the replay is keyed, Q5 pulls the transmitter line low (single transistor was used here to eliminate the need of another IC package), enabling the 7490 and keying the transmitter. As mentioned above, keying the replay allows the four count from the 7490 to reach Q1 via U3, setting the time out period for the replay at half the value chosen for operator initiated transmissions.

A revision planned for the future would include an "idle line" detector to sense the lack of regular transitions, from mark to space on the loop to time the disable relay out in sixty seconds. This would decrease the recovery time for the channel in the event that a tape reader is not properly enabled or some other malfunction keys the transmitter, but does not allow any data to be sent.

The circuit described here has been in operation for a period of four months. It has never timed out a transmission of proper duration and it has on several occasions removed the transmitter from the air when transmissions were too lengthy and a few times when the proper control codes were not received by the system.



The logic draws less than 100 ma. at five volts. The relays are 24 volt P&B KH4703 and are operated from the DC supply before it is regulated to five volts. In this case, the supply is 18 volts under the load of the five volt regulator, and is quite adequate for the reliable operation of the relays. The unit is constructed on perf board and is enclosed with the CW ID device in an RF proof enclosure. All leads entering or leaving the enclosure are bypassed.

Notice that since the timer is reset by the CW ID, that the timer would not function properly if the CW ID is inserted automatically every eight to ten minutes. The CW ID must be inserted (possibly on tape) by the control operator for the transmitter to run longer than the limit set by the timer.

*****

New RTTY Journal Awards -

I. WORKED ALL STATES (WAS)
II. FIVE BAND WAC
III. SINGLE BAND WAC

Rules and Procedure

1. Any date is valid as long as all contacts were on two way RTTY.
2. Award will be in the form of a Certificate and numbered serially from ONE.
3. Proof of contact can be made in one of the following ways:
   A. Submission of QSL's for the Award desired accompanied by sufficient stamps or IRC's for their return. There is no charge for the Award.
   B. Members of a RTTY Group or Society may have their cards inspected by an elected official of such an organization. A list of the cards including all applicable data and signed by said official may be sent in lieu of the cards. This list will not be returned unless so requested.
   C. Members of any National Amateur Radio Society affiliated with the IARU may submit as in "B" above.
   D. Those amateurs not accessible to any of the above may submit a list including all applicable data and signed by two other amateurs of that country attesting that all contacts are for Two Way RTTY.
4. All requests to be sent to --

DX Editor, RTTY Journal
Post Box 73
Blue Bell, Pa. 19422

***

NS-1 PLL Demodulator

NAT STINNETTE, W4AYV
P.O. Box 1043
TAVARES, FL. 32778

Here's a terminal unit which should interest both the beginner and old timer. It is easy to assemble and adjust and does a good joo of copying both wide and narrow shift. The circuit is shown in Fig. 1. It uses a 741 IC as limiter, an N565 phase lock loop IC, another 741 IC as voltage comparator or "slicer" and an MJE340 keying transistor.

The TU has no filters because it works on the FM principal. The theory of operation of the phase lock loop has been covered extensively elsewhere but a general understanding will be helpful. Simply stated, the incoming signal locks on a voltage controlled oscillator in the IC. The frequency of the oscillator is placed between the frequencies of the mark/space tones. As these tones alternate the output of the PLL can be made to produce a plus and minus voltage by connecting a voltage comparator to it. This plus and minus voltage corresponds directly to the mark/space tones and can be used to key the loop circuit of the teletype machine.

This method of demodulation has the advantage of no tuned filters as stated above and will tolerate considerable drift and copy shifts from 170 Hz to 800 Hz. just by properly tuning in the signal.

Construction requires no particular care and a perf. board serves quite well. A regulated power supply of 10-12 v.d.c. plus and minus is required. Sockets should be used for the ICs and transistor. The PLL IC can be mounted in a socket or molex pins.

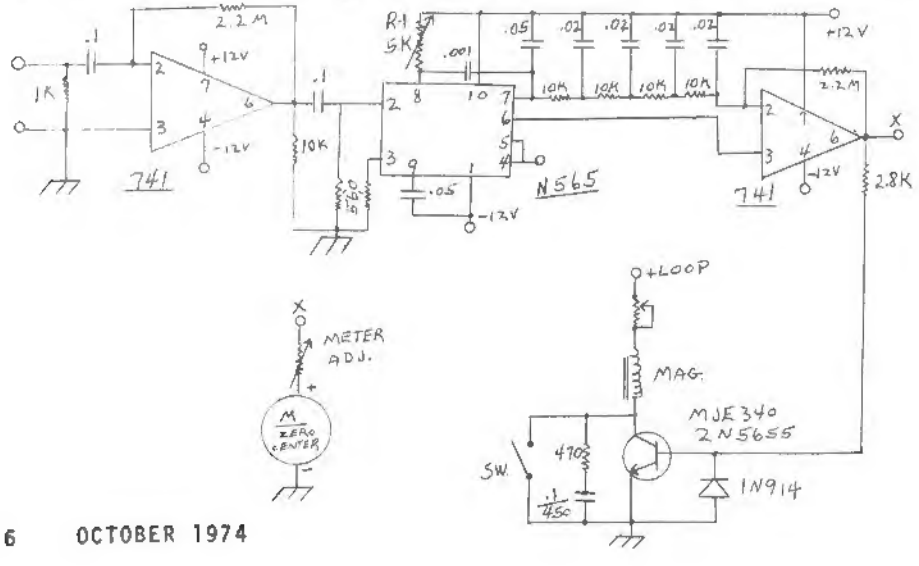
A tuning meter is required and the simplest is a zero center milliameter with suitable dropping resistor. It is connected as shown in the diagram. It indicates a plus current on mark and a minus on space. When receiving a properly tuned FSK signal the needle tends to hover around zero center. If no. zero center M.A. meter is available, use a VTVM set at about 25 v.d.c. and advance the needle to center scale.

Adjustment is easy: after connecting the loop voltage and the power supply for the TU, check the plus and minus voltages. These can be 10-12 volts but should be the same or within .5 volts. Input can be 500 ohms or even the speaker output of the receiver which works quite well. Next, close SW-1, tune in a good steady narrow shift RTTY signal, preferably running a tape. The received tones should be in the vicinity of 1m000 Hz. This can be done by ear and is not at all critical. Set R-1 at the end of rotation which is maximum resistance. The zero center meter should read approximately zero or a little on the plus side. Now advance R-1. The meter should move more to the plus side and flicker back toward zero. If it does not, change sidebands if you are receiving in the SSB mode. If receiving in the CW mode, move the BFO to the other side. Open SW-1 and turn on the teletype machine. As R-1 is further advanced a point will be reached where the machine will begin to print and the needle of the meter will stay pretty near zero during copy and maximum plus on mark/hold tone. This is the spot where R-1 should be set. As R-1 is advanced still more the needle will go back toward the minus side and eventually the machine will run open. With a little practice in tuning and watching the meter a signal can be tuned in with no trouble at all. After a while you may want to change R-1 slightly one way or the other to receive signals better at some slightly different tone. But once it is set properly it need never be changed.

With audio input off the VCO can be heard by connecting headphones to pins 4-5 and ground.

It is possible to receive both wide and narrow shift with one setting of R-1 but if it is set to receive narrow shift, the wide shift is sometimes hard to tune with the same setting. However, since narrow shift is generally used now, one setting for it should suffice. If you expect to receive both shifts regularly it would be well to install a second pot with a switch to select either wide or narrow shift.

Printed circuit boards will soon be available for this simple terminal unit.



*****

3 Speed Clock -

We have always been very intimate with Mr. Murphy. Since we have not been on the air much this summer he has left our rig alone and wandered into the Journal and seemingly found another home. Anyway the drawing below should have been included with the article "Three speed Clock for UARTS" on page 14 of last months issue. In case you have been looking for Figure 1 - here it is with our apologies again.

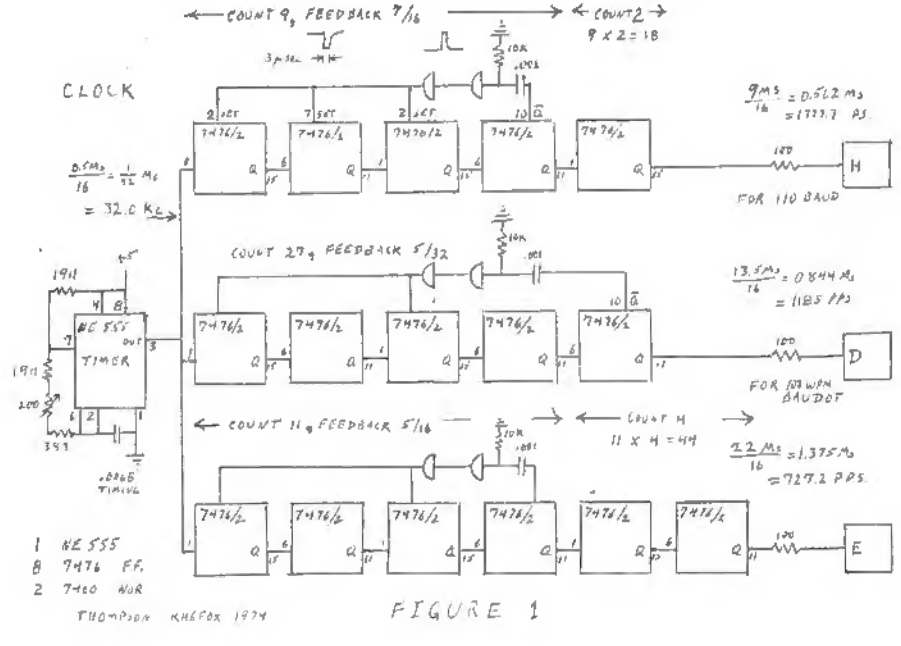


FIGURE 1

*****

DON'T FORGET- RTTY ART CONTEST- SEE LAST MONTH

VHF RTTY NEWS

RON GUENTZLER, W8BBB Editor
212 GRANDVIEW Blvd.
Ada, Ohio 45810

MISCELLANY

To start with, please note the address change. We didn't move; the U.S. Postal Service (?) moved us. The change is perhaps a good example of how long-range governmental planning can go astray. A bit over seven years ago (at the time we moved here) the rural routes were reorganized. The plan was/is to have each "Postal Patron" uniquely numbered in the sequence in which the mail is delivered. In order to accommodate future "Patrons", all vacant lots were numbered along with existing residences. In the event that someone builds a house (or moves in a house trailer) in a location not specifically numbered, a suffix system is used.

For example, assume that two houses were located about 1 km apart and that no one expected a house to be built between them. The houses might be numbered Route 1 - Box 29 and Route 1 - Box 30. Now, if someone builds a house between them, the simple expedient is to number the new one: Route 1 - Box 29A. Simple, but effective. However, what happens if the land between the two houses were used, originally, to raise tomatoes, but changes in the migrant labor laws made such farming unprofitable? An answer is to subdivide the land into "lots" and to sell them for housing (also leading to quick one time profits for the landowner); what if 40 lots are added? Unfortunately, we have only 26 letters in the Roman alphabet and most people find the Greek and Cyrillic alphabets a bit of a problem. Two answers are to: 1)Renumber all "Patrons" on the rural route, or 2)Assign addresses to the houses, the way it's done in the big cities.

Ada has undergone a "huge" building boom in the last two years, especially in the southern suburbs. The rural route numbering system broke down. House numbers have been assigned. We no longer live in the country - we are now in the big city. Route 1 - Box 30 is a non-no. 212 Grandview Blvd. is the "in thing". Please act accordingly.

VHF RTTY NEWS

Back eight years ago when Dusty took over publication of the RTTY Journal he felt that there was a need for a column containing VHF RTTY operating information. I was asked to assume the job and (obviously) did. The purpose of the column was/is to convey information about where and when VHF RTTY operation takes place. Because of the relatively short range of VHF propagation and the (then) predominant use of crystal control of receivers and transmitters, it was necessary to know what frequency contained the action before purchasing the crystals. Also, because of cross polarization losses on VHF and the almost universal use of AFSK on VHF it was necessary to know what tones were used and whether the antenna polarization was vertical or horizontal (or circular).

We have been receiving questions about who is operating where and how on VHF. Unfortunately, except for the information given below, we have not been receiving current information on VHF RTTY operation and therefore can only answer a query by saying something like: "five years ago operation was --- ." The problem has been compounded by voice alligators (repeaters with big mouths and no ears) usurping the national RTTY frequency of 146.700 MHz for voice operation.

So anyway, as an aid to newcomers to RTTY (or VHF RTTY) please let us know what activitiy is taking place. All we need to know is carrier frequency, modulation (e.g., AFSK on FM, etc.), audio frequency tones, and antenna polarization. Any elaboration is certainly welcomed (e.g., call letters, usual hours of operation, autostart use, and when). The following is just what we want - let's hear from more of you.

From Ronald J. Finger, KL7HOH, we have information about the Anchorage, AK, area: ". . .autostart net on 145.5 MHz. We use AM with the standard narrow shift tones (2125 Hz and 2295 Hz). Antenna polarization is vertical. Stations on the net so far are: KL7HOH, KL7CDG, KL7HQR, WB5DJL/KL7, KL7FLR, KL7-HOC, and W6PVF/KL7. Most stations are using the ST-5A and crystal controlled AFSK."

From N. Petlock, K9WRL: "We would appreciate it if you would help promote the use of 147.900 MHz for 100 WPM autostart 850 Hz shift. The use of this frequency now could give RTTY operators a national frequency for 100 WPM. Some of us are now preparing to activate this frequency in the Chicago area."

From Larry W. Herring, WB5GRF: " . . . there is now quite an active group in the Dallas, Ft. Worth "Metroplex" on 146.70 MHz FM AFSK 60 WPM 850 Hz shift and also a few using 146.10 MHz FM AFSK 100 WPM 850 Hz shift. The thirty or so of us invite locals to join us for all sorts of pictures, bulletins, and just good ole rag chewing. There are quite a few on 24 hour autostart."

Thank you. That's the kind of information we want. How about some more from elsewhere?

CURRENT AWARENESS

We have been watching RTTY related articles in other publications. As we find them we will mention them here. If any of the readers know of RTTY articles in the current literature that we do not mention, please let us know about them. "Continuous Phase Audio-Shift Keyer for RTTY", Eric Kirchner, VE3CTP, Ham Radio, 1973 OCT, pp. 10-13. "Variable-Shift RTTY Terminal Unit", Keith Sueker, W3VF, Ham Radio, 1973 NOV, pp. 16-24.

BANDWIDTH PROBLEMS

We occasionally get a letter from a newcomer to RTTY who is having problems receiving FSK on the HF bands. The teleprinter can "talk to itself" over a local loop, but off-the-air reception is no good. A common source of the trouble is that the receiver (a good SSB receiver) has a bandwidth too narrow to pass the Space tone. (This problem is especially severe when wide shift reception using the "standard" 2125 Hz Mark - 2975 Hz Space tones is attempted.) Please consult the manual for the receiver you are using to see what the passband specifications are for that receiver.

If the receiver bandwidth is too narrow, at least two solutions are possible: 1) Modify the receiver so that it will pass the tones, or 2) Modify the TU so that it will handle lower frequency tones.

The latter solution is especially desirable because it is so simple; merely increase the capacitance across the Mark and Space tuned circuits in the TU. For example, instead of 2125 and 2975 Hz (wide shift Mark and Space) use 1275 and 2125 Hz; or instead of 2125 and 2295 Hz (narrow shift Mark and Space), use 1275 and 1445 Hz. These changes should bring the tones within the passband of the receiver. If you are using the ST-5, see RTTY Journal 1973 MAY-JUN for the required component values.

The above solution applies to FSK operation only, because, as we mentioned in the Beginner's Series several months ago, the received tones appearing at the receiver output are determined by the receiver tuning. The transmitting station determines only the shift not the absolute values of the tones. You select the tones by the way you tune the receiver. However, in the case of AFSK on AM or FM, the transmitting station controls the absolute value of the tones. Whatever tones he sends, you receive. If your receiver is too narrow for his tones, he will have to change them or you will have to modify the receiver. We have found that the old Motorola FM receivers had an audio peak at about 500 Hz with a rather fast roll off above that. (A 6 dB drop in response from 2125 to 2975 Hz.) We built a rather simple network placed between the receiver output and the TU input to "correct" this response (the response was very desirable for voice communications, just undesirable for RTTY).

SUMMARY

Remember, we have a new address. Please send information regarding RTTY operating information who, what, when, and how. If you know of any good RTTY articles and we don't or didn't mention them here, let us know about them. If you are having troubles receiving FSK signals, cast a suspicious eye at the receiver bandwidth.

73 ES CUL, RG

***

CW IDer--

CONTINUED FROM PAGE 13

circuit board with the cathode band toward the board.

Q2 and Q3 are high voltage keying transistors. If you are keying a positive voltage Q3 and the 1K resistor are omitted. For negative voltages, Q3 is also installed. Q2 is rated at 300 V and Q3 for 80 which is adequate for the ST-6.

BOARD AVAILABLE

An epoxy plated undrilled circuit board is available from K4EEU in US or Canada only, for $8 postpaid. Parts locations are screened on the circuit board.

***

RTTY-DX

JOHN POSSEHL - W3KV
Box 73 Blue Bell, Pa., 19422

Hello there . . .

The 4th World Wide RTTY Contest sponsored by the SARTG took place in what can best be described as excellent conditions. The three eight hour operating periods with eight hours of rest in between is an excellent format for a contest and allows all areas to better utilize the changing propagation conditions over a twenty-four hour period. It also forces one to use the lower frequency bands if one wishes to make a good score.

The highlight of the Contest as far as DX was concerned was the long awaited activity from OX3JW, OX3XX, and OY1M. These boys increased the country totals of many of the participants and although they were quite weak in many areas it must be said that they were in there trying. While we did anticipate activity by the stations noted above, the real surprise was activity by GD3SUJ from the Isle of Man. Unfortunately the short contest QSO and the indescribable QRM did not allow us to gather additional information on this station.

All Continents were represented and some of the stations noted in each were -- KZ5LF, XE1WU, VP2MKH, HP1AH, FG7XT; LU2ESB, CE3EX, CE3MA, CE3GK; TF3IRA, OH2AM, OH2BJ, OH0NI, LA2IG, YU3EM, YU2CAL, YU2RWR, OK1MP, UK4FAD; ZS6BBK, CR6FY; VK3NR, VK5IF, KX6LA, KH6AG, P29MC; JA1ACB, JA1DI, JH1TFF; all of which are only a few of the overall activity for the Contest.

When the Contest ended it was like someone shut the door to keep out the noise. The bands went back to their old ways of very little activity. If you missed the Contest you can still find OX3JW who is --

Bjarne Johansen Box K
3930 Groennedal, Greenland

Mike, OY1M, has been active almost daily and while we print many stations in Europe in QSO with him his carrier just cannot be heard here in the States, at least at this location. You can QSL to --

Michael Arnskov P. O. Box 12
3800 Torshavn, Faeroe Islands

There may be more interesting activity from Scandinavia in the near future. Krist, TF3IRA, says that Bear Island has a ST-5 in the works which should mean that a machine is already available. This would be a JW prefix and count the same as Svalbard.

The Summer months usually brings some DXpedition activity. For a couple of weeks in August C3ICA was quite active from Andorra. If you made a contact QSL's go to --

Pierre Pollidoro, F2PY
8270 Montpezat-du-Quercy
France

There was also reported activity from C3IBL but at the moment we are at a loss as to who this chap was.

The Ivory Coast has been off the active list for several months since Mike, TU2DD went QRT. We are pleased to report that the gap has been filled by Jean, TU2DU, who has been quite active in recent weeks. Running only 35 watts to a dipole he has been putting an outstanding signal into the States at around 2300z. QSL to --

Jean de Cumont
P. O. Box 4643
Abidjan, Ivory Coast

Judging from the QSL's passing through here for DXCC credit it seems that using the homemade QSL technique for obtaining a card from ex-YN1CW is still working in spite of the "revolution" that took place recently in the Yeman Arab Republic. Details on how to do this were in the July/August issue.

That special call sign PZØCJ recently printed was from a station set up at the Boy Scout Jamboree held in Surinam in late August. Both Jeff, PZ1DJ, and Arnold, PZ1AP were at the keyboard at various times and no doubt had a hand in setting up the station. We imagine that you could QSL to either and their QTH's have been previously published.

Those of you looking for that rare continent of Antarctica might watch for VP8NS who shows up quite often on 14090 khz after he completes his traffic to England. Paul is located on Stonington Island and sends at 50 baud with 170 hz shift. Time has been around 21-2200z.

After a long period of QRT, Ariel, 4X4MR is again quite active with good signals.

Also from Asia JR6AG on Okinawa has been active and EP9WL has been reported by ON4CK.

Did you ever wonder just how many RTTY stations have been active on the bands? Bud, W2LFL recently gave us some information that will give you a fair idea. He has had a total of over 5000 QSO's and of these some 3300 were DXcontacts. For different stations worked it was about 700 USA and 840 DX for a total of approximately 1540. That figure represents quite a few printers in use around the world and of course it does not account for the many in the hands of SWL's, and those gathering dust in shacks where the fellows have not gotten around to setting them up as yet.

It is with great pleasure that we introduce the latest amateurs to be awarded the RTTY Journal 100 - DXCC Plaque.

Nr. 15 Gin S. Naniwada JA1ACB
100 Confirmed

There can hardly be a RTTY operator around this world that has not had a contact with Gin. He is one of the most active stations on RTTY and is always there to give that rare Asian multiplier in a Contest. In receiving the Award it makes Gin the first station in Asia to do so in an area where just about all the contacts are several thousand miles away. Gin was licensed in 1954 and was the first SSB station active from Japan. His interest in RTTY dates back to 1952 when he used to visit KA2HQ the main station of the U.S. Forces in Japan. At that time Joe, W5UKM, would show Gin the then little known mysteries of teletype. He finally obtained a Model 15 in 1969 and after waiting 7 months for a governed motor got on the air in early 1970. Gin's intense interest in the mode enabled many other stations in Japan and in fact many other countries in Asia to become active on RTTY. Gin wishes to express particular thanks to Merrill, W6AEE, and Irv, W6FFC, in helping him through the rough spots at the very beginning.

Nr. 16 Peter Von Chrustschoff
K8YEK 100 Confirmed

You may not have heard too much of Peter as he is what may be termed the typical "DX Hound", very few stateside contacts but always in there when there is a rumor of a new country about due and usually among the first to get him.

Peter is aged 47, has the Extra Class license and when not chasing DX he is a Senior Electrical Engineer for the Ford Motor Company. He first got started in RTTY in 1962 with the help of Dick, W8CAT. Present equipment is a HT32 TX, a linear running 450 watts into a TA-33 at 40 feet with a dipole and inverted vee for 40 and 80. Receiver is a Drake R4-A, printer is a Model 15 with assorted tape gear and the ST-6 replaced the original W2JAV TU he started out with.

Since the brief announcement of the new Merit Awards available to the readers of the Journal, and even before the "rules" were published we had an immediate response from the following stations for the Awards indicated and in the order received. The most convincing proof is the QSL cards and both stations did just that.

Probably the most difficult accomplishment after DXCC on RTTY is to Work All States. We all congratulate the following amateurs for completing this difficult project.

RTTY Journal Merit Award for W A S
Nr. 1 Glenn R. Kurzenknabe K3SWZ
Nr. 2 Richard "Knobby" Walsh W2PLQ

RTTY Journal Merit Award for Single Band W A C
Nr. 1(14 mhz) Glenn R. Kurzenknabe K3SWZ

In closing we remind you that the "big smoke" will become a real hot fire the week-end of October 5th. See last month for the rules and join in the fun, you just may win one of the beautiful awards offered.

DX-RTTY October 1964

W6AEE reports copy from LA6VC; I1CIQ, DJ4KW, and I1AHN. Sergio, I1AHN is also reported to be the loudest and most active station from Europe. W4AIS reports contacts with PY2BCD, OZ3WK, and OZ8EA. LU1AA received WAC Nr. 41. OE1HQ and OE7RQ have Creed 7B printers and KP4AXM is fb copy on the west coast.

73 de John

***

***

They say good things come in bunches. This seems to be true on articles. Right now we have several more articles on CW ideas, we would like to run them all in one issue to give readers a choice but lack of room prevents that if we have any variety. We also have several articles on 28 modifications and will try to run them both in one issue. Right now we are still looking for shorter articles to fill up those half column spaces.

***

The CW IDer-

"BERT" KELLEY, K4EEU
2307 S. Clark St.
TAMPA, FL. 33609

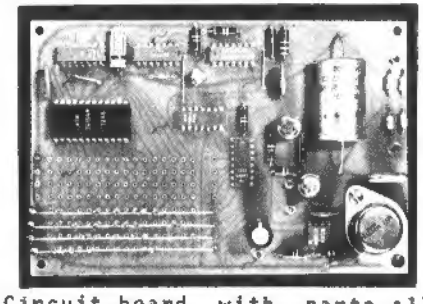
THE CW ID-ER

This device will automatically generate call letters for the required CW identification during RTTY operation. At the end of transmission, you tap a push-button and the transmitted code will be perfect spacing, every time. The button can be at any convenient location such as the machine keyboard. If you have been hand sending CW or using a mechanical code wheel, here is a way to improve the station at a modest investment.

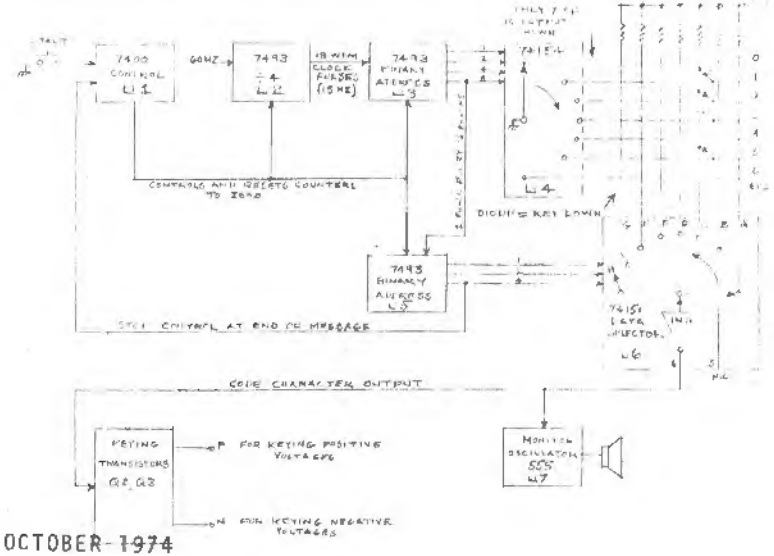
The ID-ER is complete on a small 4 x 6 circuit board, and has a built in power supply, adequate 128 bit diode memory, universally available parts and integrated circuits, low construction cost, and provision for either positive or negative keying without replays. There is also a built in audio monitor. The speed is derived from the AC line at a fixed 18 WPM. This gives CW of adequate speed and fully complies with 97.87 (h).

CIRCUIT

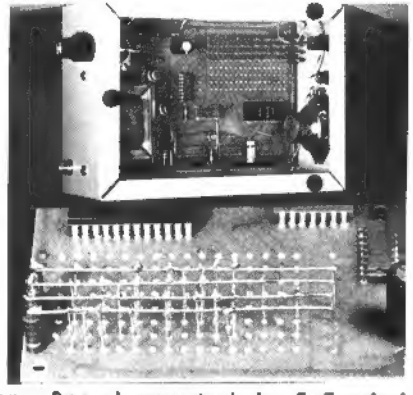
The block diagram shows the functions of the integrated circuits and the diode matrix as programmed for "DE K4EEU". U1 is the start/stop control and resets U2, U3, and U5 so they start each sequence from the same point. When the push button is pressed, U1 sets, the control line goes low, and U2 starts dividing 60 hz pulses from the AC line to 15 hz which drives U3, The BCD output of which determines the status of U4, a four line to 16 line decoder/multiplexer -- actually a kind of single pole, 16 position rotary switch. As U3 advances, U4 grounds each of these 16 outputs in sequence. U6, acting in combination with U5, selects the eight output lines A through H in the matrix, multiplying the sixteen outputs of U4 to give 128 positions or "bits". When U6 has selected all eight matrix output lines, it generates a pulse which resets U1 and concludes the sequence. All eight input lines to U6 are pulled up to a logic one, or positive voltage by individual 2200 ohm resistors. The output of U6 is then low and the keying transistors are open unless the selected input line A through H is grounded in some manner. This is done by diodes



Circuit board with parts all installed. Note ample reserve space in the diode matrix..



connected to U4. If we assume the CW ID-ER is at rest Pin 1 of U4 is grounded, and input line A of U6 is active. This is the "O" starting point, and since no output is wanted here, this position has been omitted from the circuit board layout. When the button is pressed, the matrix is scanned from the resting point A-O, though A 1, 2, etc., to A 15, then B 0, 1, 2, and so on, until the operation concludes at H 15. This is referring to the circuit board layout, and is in reverse to the way you would read a paragraph in a magazine.



Top--Board mounted in 5x7 mini-box on threaded spacers.
Bottom- Side view showing diode matrix construction.

CONSTRUCTION

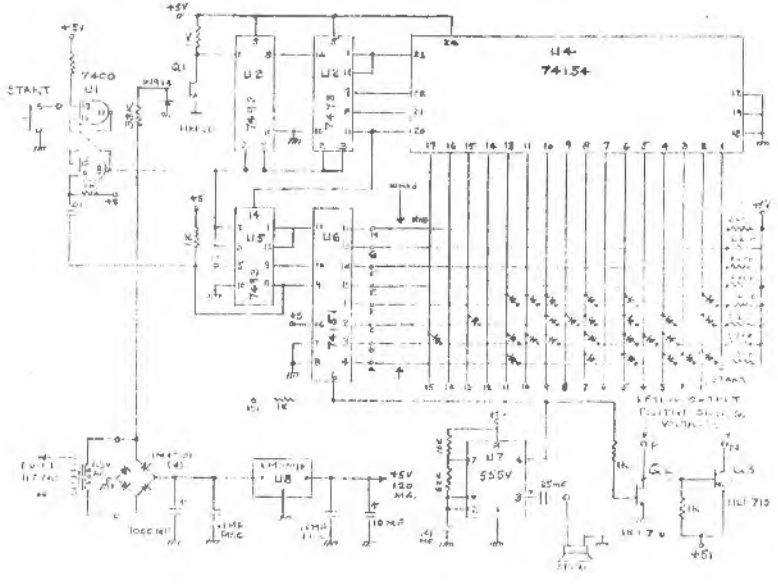
A circuit board layout is given for those who wish to build their own boards. The transistors are universal replacement types such as Motorola HEP50, 706, and 710. RCA has a similar line in the SK series. SK-3018, 3103, and 3025 may be used. The diodes and integrated circuits can be obtained from firms advertising in the ham magazines.

There is provision on the circuit board for a 555 timer IC which is a very satisfactory audio monitor. You may want to add a 100 ohm volume control at the speaker to reduce the monitoring level. All the parts can be mounted on the circuit board in about one hour and bench tested, and programmed. The board can be installed in a 5 x 7 x 3" chassis, or mounted in vacant space in the demodulator.

PROGRAMMING

Programming is done by installing diodes at locations where a tone is wanted on the matrix according to the following rules: The first bit, A-O, as previously mentioned is reserved for standby. A dash is three bits, or three diodes in a row; a dot is one bit, or one diode; and a space is one bit, or no diode. Three vacant bits between characters, and seven bits between words. The diodes can be either silicon or germanium, but checked with an ohmmeter, and mounted vertically on the

CONTINUED ON PAGE 9



CLASSIFIED ADS- 30 words $2. Additional words- 4¢ ea.

Cash with copy, Deadline 1st of month.

MORE RTTY! ONLY HAM RADIO MAGAZINE consistently brings you more RTTY articles and better RTTY articles than any other general amateur magazine. You need RTTY Journal, but you need HAM RADIO also. $7.00 per year, $14.00 for 3 years. Ham Radio, Greenville, NH 03048.

CHICAGO AREA OPERATORS, EXPERT REPAIR work performed at reasonable prices. Cleaning and lubrication; printers $11.00, Keyboards $6.00, Reperfs $8.00, Repair work, any model teletype apparatus, $17.00 plus parts. Phone (312) 392-2358. Contact Neil.

SAROC TENTH ANNIVERSARY NATIONAL CONVENTION January 2 - 5, 1975 in Del Webb's Hotel Sahara Space Center. QSL for registration and special airfare information. SAROC, POB 945, Boulder City, Nevada 89005.

WANTED: TELETYPE MACHINES also parts and accessories for Models 28, 32, 33 & 35. Call or Write: A.D.M. Communications, 1265 Simpson Way, Escondido, Calif. 92025 (714) 747-0374

WANTED: CV483/URA-17 group, will pay $200.00 cash. Also want RO Mod. 28 Mark III printer. Also need model 28 printing reperf, unit only. George Tate, W4AIS, 300 Thornwood Dr. Taylors, S.C. 29687.

WANTED: MODEL 33 & 35 EQUIPMENT. Complete or partial units, any quantity. Will pay shipping. Terminal Systems, Inc., 11300 Hartland St., North Hollywood, CA 91605 (213) 769-6772.

WANTED: LTPE-1 PERFORATORS; LRB-6 Underdone reperforators - must have 3-speed gear box. Also interested in Models 28, 32, 33, 35 & 37s. Will pay top price. Amber Industrial Corp., Phone 201/824-1244.

NEWS-NEWS-NEWS - Amateur Radio's newspaper, "Worldradio", Trial subscription-Two issues for one dollar. "Worldradio" 2509-F Donner Way, Sacramento, Calif. 95818.

SELL: M28KSR SKINTIGHT MK III, mint, $250.00. M28 self contained LXD TD, $75.00. M28 50/60 hz governed motors, $10.00. Collins R648/AAR41, converted, $295.00. Frederick model 1500 RTTY receiver, xtals, $295.00. TMC STR-1 solid state xtal controlled HF receiver, $175. Northern Radio Model 174-1 diversity converter, $85. SASE for RTTY list. Mac McGinnis, WB5LID, 4304 McFarlin Blvd., Dallas, TX. 75205.

TELETYPE RIBBONS, Black nylon, fresh stock - $3.95/DOZEN, 50¢ each, plus postage (2 pounds per dozen). CV-89 SCHEMATIC and 14 important pages copied from NAVSHIPS manual. $2.95 postpaid. 11/16" PERFORATOR TAPE, $2.95 for ten rolls, $8/case of 40 rolls plus shipping (49 pounds per case). JIM COOPER W2BVE, Communications Equipment, Supplies and Information, P. O. Box 73-T, Paramus, NJ 07652.

HAL COMMUNICATIONS CORP. announces the DKB-2010 Dual Mode Keyboard. Provides flawless transmission of RTTY and Morse Code with standard 3 character buffer and optional 64 or 128 key buffer. Call letter identifier and "Quick Brown Fox" sequence standard. Write for detailed spec sheet. HAL Communications Corp., Box 365RJ, Urbana, ILL. 61801. Phone 217-359-7373.

FOR SALE: HAL RVD-1002 VIDEO DISPLAY unit. Guaranteed perfect condition. Need money. $400 prepaid. Claude Sweger W5SHC Box 1842 Ft. Stockton, Tx. 79735.

11/16 PERFORATOR TAPE. PINK, 14" dia rolls. 2" core, 16 rolls per case. $5.00 plus shipping. 45 lbs. 3/$1.00. Wiedman, K4KOE, 204 Anne Burras, Newport News, VA. 23606.

TELETYPE - KLEINSCHMIDT - MITE -; gears, parts, manuals, tape (11/16, 7/8), toroids, SASE for list. Typetronics, PO Box 8873, Ft. Lauderdale, FL. 33310. Wanted; Tubes 122, 2BP1, Kleinschmidt TD, 60 speed gears, also Mite 75, and 74912 - trade 74913. W4NYF.

DIGITALLY CONTROLLED VFO SYNTHESIZER covers 5-6 MHz in steps of 100 Hertz and with accuracy and stability to one Hertz. Set your frequency with four thumbwheel switches (included in price) or "tune" it with automatic or programmable means. Spurious outputs down at least 60 dB. Direct outputs 50-60 MHz and 100-120 MHz also provided. All on one 4X6 circuit board for $245. Universal audio, AFSK, and VLF synthesizer covers 0 to 100 kHz in one Hertz steps: kit $135. Programmable RTTY stunt box answers with your message when someone calls your station: coming soon. Sase for information of these and other RTTY products. Petit Logic Systems, Box 51, Oak Harbor, Wa. 98277.

88 MILLIHENRY TOROIDS, clean, unpotted. Shipped postpaid in the US. Bakers dozen (13) for $5.00. T-C-V Co., Box 4117, Alexandria, VA. 22303.

SALE: MODEL 28 TYPING REPERF, type TT 315/UG code LPR-35, or TT 317/UG code LPR-37, tape data 11/16" wide, chadless or fully perforated; Good $25.00 each. Model 28 transmitter-distributor type TT 334/UG code LXB-9, Good $25.00. Tuning forks 96.19 VPS. or 120 VPS. Unused $2.00 each. Mite PD/82U 115 VAC, 60 Cy. Synchronous motor with connector Unused $18.00 . . Reader, High speed Ferranti model 11 or 111 Good $15.00. TT Socket wrench 5/16" with 12" long handle Unused .75¢ each. 60 WPM set of gears for Model 14 T.D. 1800 rpm Unused $4.75 . . Model 14, 15 and 19 Machines available as well as others and parts also . . Send us a list of your needs. Atlantic Surplus Sales, 1902 Mermaid Ave., Brooklyn, N.Y. 11224.

88 AND 44 MILLIHENRY TOROIDS, unpotted, $5.00 per Doz. TELECOM, Box 411, Alexandria, VA. 22303.

HAL COMMUNICATIONS CORP.: HEADQUARTERS for MAINLINE Solid State RTTY Equipment. In demodulators, choose from the incomparable ST-6 or, for a low cost beginning in RTTY, the ST-5. Tailor either to your requirements by selecting the 425 Hz press discriminator, the AK-1 AFSK oscillator, and table or rack mount cabinets (or the ST-6, or the AK-1 AFSK and the ST-5/AS autostart for the ST-5. Full details available in our current catalog. Charge your purchase to your BankAmericard or Master Charge account. HAL Communications Corp., Box 365RJ, Urbana, Illinois 61801. Phone 217-359-7373.

METRIC SYSTEM EXPLAINED, 500 Physical Measurements Converted. Booklet $2.00 H. Morgan, 883 Diana Akron, Ohio 44307

TECH MANUALS---$6.50 each: TT-63A/FGC, CV-591A/URR, R-390/URR; following manuals $8.50 each: TT-47/48, R-388/URR, USM-50, 51J4, FR114/U; following manuals $10.00 each: R390A/URR, SRR-11, 12, 13, USM-32, URR-35C. Special manuals (limited quantity): TM-03315-15 TGC-14/14A $10, Navships 95898 TT-298A/B, TT-299A/B $12.50, Navships 0967-170-8010 UGC-38, 40, 41 $12.50 14 TD manuals $2.50 each. Thousands more in stock. Send 50¢ (coin) for large list. W3IHD, 7218 Roanne Drive, Washington, DC 20021.

CLASSIFIED ADS-

CIRCUIT BOARD SET for "Low Cost Rtty Counter" Oct. 73 Journal. Includes two counter modules, FET front end, 60 hz time base and a bonus scaler board. Scaler will operate to at least 220 mhz. Boards are G-10 epoxy, plated, undrilled, with full size photos showing each assembly. Necessary info included. Set $10 postpaid in US, add $8 for Universal Frequency Standard board. Bert Kelley, 2307 S. Clark Ave., Tampa, Florida 33609.

R-390 VERY GOOD SHAPE $350; Collins 32S1 clean with 516F2 $375; Power supplies: TEMPO I 12vdc $75; S-line homebrew $40; TTY GEAR: MOD14 reperf, good shape $30, MOD 28 KSR $200; TUBES: NEW PL-172 $80; 4-400A $25; USED 4-1000A $30; 4-250A $17; 4-125A $12; VacVariable 20-60PF Jennings $15; DX-40 new, needs debugging $30. BC-221 w/cal charts book $25; Johnson Viking Mobile xmtr $30. G.L. HALE K0PIV/4 6334 Edward Street, Norfolk, VA 23513 Phone 804/857-1507.

HAL COMMUNICATIONS CORP. can provide you with the proven video display system, the RVD-1002. When coupled with the RKB-1 keyboard, you will have the ultimate in noiseless, reliable reception and transmission of Baudot coded RTTY. The RVD-1002 receives TTY pulses from the HAL ST-6 or any other demodulator, and generates a 1000 character display. Copies at all four standard speeds with selectable unshift on space. The RKB-1 features a high quality commercial keyboard, reliable solid state circuitry, and a rugged, attractive cabinet. BankAmericard and Master Charge now accepted. HAL Communications Corp., Box 365RJ, Urbana, Ill. 61801. Phone 217-359-7373.

WANTED: MODEL 33 or 35 ASR, will trade R390's, or new model 28RSR. C. F. Burney, 151 Mission, San Francisco, CA. 94105.

WANTED: SKIN TIGHT CASE, TD. Reperf for 28KSR, R.F. Signal generator, other RTTY accessories. Emile Alline, 1119 Penn Ave. Slidel, LA. 70458.

FOR SALE: GALAXY MARK 3, Transceiver with both power supplies. $250.00. Crating and shipping extra. W9WKC, Ed. Trego, 517 Market St. Hoopeston, IL. 60942.

FOR SALE: 28KSR $135.00. Table model in good condition. Write Dave Gould, WA7JMG, 4230 Jade N.E., Salem, OR. Phone (503) 393-7737.

HAL COMMUNICATIONS CORP. WILL DISPLAY THE LINE of RTTY equipment at Hamburg, Memphis, Tampa, Hamilton-Ontario, San Mateo, and San Diego. Phone your orders for pickup at the show. HAL Communications Corp., Box 365RJ, Urbana, Illinois 61801. Phone 217-359-7373.

BOOKS FOR RTTY FANS. The Teleprinter Handbook by G3LLZ & G3NNT. The largest and most complete handbook on RTTY ever published. Covers machines, accessories, test equipment, everything you're looking for -- $14.95 ppd. Confidential Frequency List by WB4PYQ. Covers all types of on-the-air activity not listed in other books. Many RTTY stations listed -- $3.95. HAM RADIO, Greenville, NH 03048.

TWO NEW GENUINE TELETYPE KITS for Auto CR and LF for Model 15 or 19 with instruction manual-$10.00 each - Post Paid. Back issues of RTTY from Jan. 1958 - 10¢ each. Also manuals for models 15-19-28 write. Ladd W3KA 10406 Insley St., Silver Spring, Md. 20902 (301) 649-5580.

PLEASE SELL OR LOAN ME your copy of RTTY Journal, January 1968, to make copy. Thank you. W7NXJ, 7307 S.E. Thompson Rd. Milwaukee, OR. 97222.

ST-6, 850/170. Factory wired, rack mount, $250.00. Yaesu FT-101, $425.00. New FT101B with Cw filter and fan. $600.00. KH6IHP, 1624 Kaweloka, Pearl City, HI. 96782.

OA-5 SOLID-STATE TU. See February and September issues of "RTTY Journal." Drilled and plated boards, $15.00; board with parts, $100.00; complete unit, ready for air, $210.00. FOB. WA8ETX, Ken Simpson, 3700 Mountview, Alliance, Ohio 44601.

CANADIAN HAMS: HAL COMMUNICATIONS CORP. will display the line of RTTY equipment at the Radio Society of Ontario Convention, Hamilton, Ontario, October 25, 26, 27. Conditions permitting, we will be prepared to sell equipment at our regular prices plus applicable Canadian duties and taxes. Phone your order and we will see you at the RSO Convention.

SALE: MODEL 28 TYPING REPERF, type 315/UG code LPR-35, or TT 317/UG code LPR-37, tape data 11/16" wide, Chadless or fully perforated; Good $25.00 each. Model 28 Transmitter-Distributor type TT 334/UG code LXB-9, Good $25.00 each. Tuning forks 96.19 VPS. or 120 VPS. Unused $2.00 each. Mite PD/82U 115VAC, 60 cy. Synchronous motor with connector Unused $18.00 each. Reader, High Speed Ferranti model Mark II or III Good $15.00. TT Socket wrench 5/16" with 12" long handle. 75¢. 60 WPM set gears for Model 14 TD 1800 RPM Unused $4.75. . . Model 14, 15, and 19 Machines available, Also LORENZ LO-15 ASR and KSR (IT'S A REAL BEAUTY). Send us a list of your needs. ATLANTIC SURPLUS SALES CO. 1902 Mermaid Ave. Brooklyn New York 11224 Tel. (212) 266-2629.

MODEL 28 - RIBBON REINKERS - MODEL 28 We have cleverly (well, we think so!) remanufactured the Model 14 reinker mounting brackets, so that they install on the Model 28 typing units in just minutes. No cutting, or drilling required. Comes with installation instructions, spare inkwell, replacement felts, etc. Send check or money order for $3.50 (includes postage in U.S. - overseas customers include an additional $.50) to: W. H. Craig, P.O. Box 947, Grayson, Kentucky 41143. For an additional $.85 we'll include a nice fresh tube of NCR's K-575 black ink. Return for full refund if not satisfied. Limited quantities.

TECH MANUALS---$6.50 each: TT-63A/FGC, CV-591A/URR, TS-2/TG, CV-116; Following manuals $8.50 each: TT-47/48, R-388/URR, FR-114/U, USM-50, 51J4; following $10.00 each: R-390A/URR, SRR-11, 12, 13, USM-32, URR-35C; Model 14 TD manuals $2.50 each. Other manuals now available: (limited quantity) UGC-38, 40, 41 $13.50, TT-298A/B, TT-299A/B $15.00, WRR-2/FRR-59 $22.50, WRR-3A $18.50, UPM-70, 70A $20.00. Immediate delivery. Prices postpaid in USA only. Thousands more in stock. Send 50¢ (coin) for large list. W3IHD, 7218 Roanne Drive, Washington, DC 20021.

*****

Dayton Hamvention April 25-26-27, 1975. Make your plans now for all 3 days. Our RTTY room will be at the Imperial North Motel. It sells out early - so get your reservations in . . .

***